



Researchers at the Pasteur Institute abandoned their top candidate for a COVID-19 vaccine.  
CHRISTOPHE ARCHAMBAULT/AFP/GETTY IMAGES

## After coronavirus vaccine failures, France laments the state of its biomedical R&D

By [Tania Rabesandratana](#) | Apr. 21, 2021 , 4:15 PM

On 25 January, as France's third pandemic wave gathered force, Christophe d'Enfert, scientific director of the Pasteur Institute, appeared on national TV with a grim duty: explaining how the venerable institute, named after vaccine pioneer Louis Pasteur, had given up on its most advanced COVID-19 vaccine candidate. Around the same time, French drug giant Sanofi said its own contenders were delayed—and that it would cut hundreds of French jobs. Today, France remains the only nation on the U.N. Security Council without a viable vaccine. To d'Enfert, it “brings into question our capacity not only to do very high-level fundamental research, but also to transform this into innovation.”

The high-profile failures have cast a spotlight on the problems facing biomedicine in France. Although no one failure could have been predicted, the pattern “is not just bad luck,” says Audrey Vézian, a sociologist of biomedicine at CNRS, France's national research center, in Lyon. “It shows that something isn't working in our innovation process.” Some experts cite a squeeze in basic research funding and scarce venture capital. Vézian also blames a proliferation of bureaucratic organizations that waste resources and add confusion.

Margaret Kyle, an economist at Mines ParisTech graduate school who coauthored a January study by the Council of Economic Analysis (CAE), a government advisory body, says France ought to be well-positioned to do biomedical research—and to

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commercialize it. Its education system churns out talented scientists, and it has a national health care system, which provides data that can be deployed in medical research. But recent analyses paint a picture of long-term erosion in public biomedical investment. The CAE study found that public spending on biology and health research has shrunk dramatically since 2011, even as it grew in Germany and the United Kingdom (see chart, below).

Bruno Canard, a structural biologist who studies coronaviruses at CNRS in Marseille, has felt that decline firsthand. For instance, he says, France only has three of the cryo-electron microscopes (cryo-EMs) that can reveal molecular structures like that of the coronavirus at near-atomic resolution; Germany and the United Kingdom each have about two dozen. And France's national research funding agency, set up in 2005 to provide competitive project-based funding, has seen its budgets drop sharply. Emergency COVID-19 research money has begun to flow, which Canard says has returned his lab's budget to 2003 levels. But by the time pandemic funds were available, he says, "Chinese teams, among others, had already published the first cryo-EM papers in *Science*, *Cell*, and *Nature*."

Biotech startups, critical in pharmaceutical innovation, are also less well funded in France than in its European peers. Funding through France's public investment bank (BPI) and tax rebates can be generous in the early stages of business development, but private funding is too sparse to enable enough companies to grow significantly at later stages. In 2020, French health tech startups each raised only €8 million in venture capital on average, compared with €12 million in the United Kingdom and €25 million in Germany, according to data compiled by the trade group France Biotech.

In the first 5 years after biotechnologist Odile Duvaux co-founded a startup called Xenothera in 2014, she raised €6 million to develop the company's immunotherapies. Things picked up during the pandemic, when BPI gave Xenothera €5.3 million to scale up production of an intravenous COVID-19 antibody treatment and test it in trials; since then, the company raised another €10.3 million and the treatment is being tested in 35 hospitals in France, as well as five other countries.

## A sickly budget

Public funding for health research has fallen in France—one factor in the country's slow pace of biomedical innovation.

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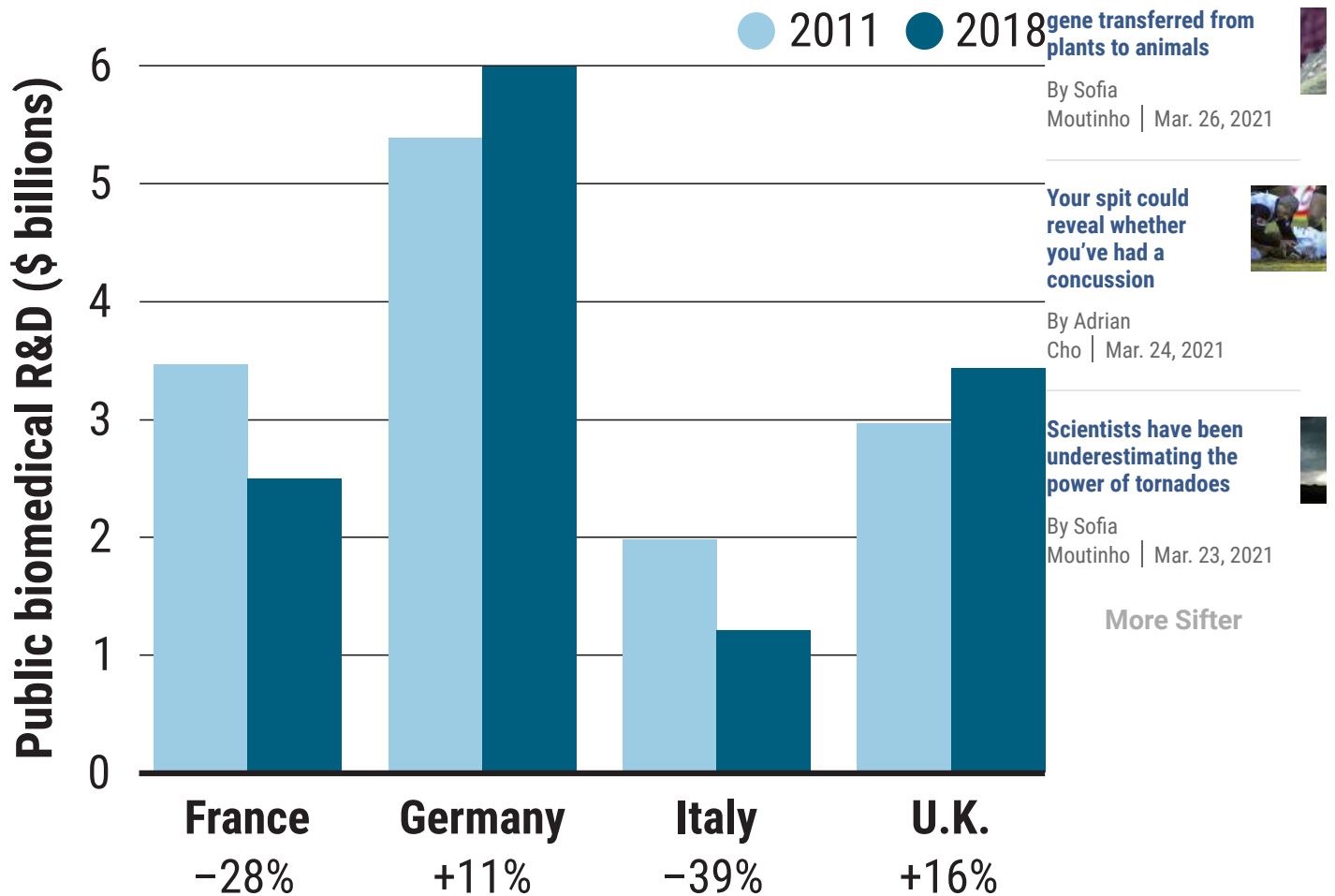
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But Duvaux says those amounts are dwarfed by what U.S. companies are often able to raise. “We’re running after nickels and dimes,” she says. “We need preorders. That’s what the U.S. government does; that’s what the U.K. government is doing with [French vaccine company] Valneva: they buy millions of doses before knowing if the products work,” and shoulder the risk. In contrast, French leaders tend to be suspicious of biotech companies or oblivious to them, instead favoring well-established academic centers and pharmaceutical firms, Duvaux says. But neither is as nimble as a startup, she says: “A paddleboat or a petrol tanker can’t go fast.”

French organizations, both public and private, lack “mixed expertise”: people with experience with both health and biotech as well as finance, law, and business, according to a 2017 report by the Boston Consulting Group, commissioned by France Biotech. The report blames France’s predilection for elite schools that train generalists rather than specialists. France Biotech President Franck Mouthon says administrative burdens and safety procedures, added after health scandals, also weigh down the country’s innovation system. “There is money flowing to fund innovation in France, but we need reforms,” he says. For instance, members of ethics committees that examine clinical trials applications are drawn randomly to limit conflicts of interest, but that also means they often don’t have the relevant expertise, he says.

Changes are afoot. The current administration pledged to reverse what it calls “decades of underinvestment” with a **10-year plan and reform enacted in December 2020**. The plan aims to raise R&D spending from 2.2% to 3% of gross domestic

product, in line with Germany's, increasing public spending from €15 billion to €20 billion by 2030. It also intends to make research careers more attractive by boosting meager salaries and creating junior tenure track jobs, a novelty in France. (Some researchers have protested the law, arguing that the budget rises are not enough, and that the junior jobs are a downgrade compared with lifelong state employment.)

Change is coming to the startup world as well. Mouthon says the pandemic has smoothed communication with health authorities, helping startups get clarity on regulatory requirements early on. And last summer, the government induced a group of insurance companies and semipublic institutions to pledge €6 billion in tech investment in France through 33 funds; nine of these funds are dedicated to health.

Many scientists hope, cautiously, that the COVID-19 wake-up call will bring lasting improvements. At Pasteur, researchers are pressing on with two other vaccine candidates and other COVID-19-related research, in part thanks to public donations. D'Enfert says the institute is contemplating starting a production unit, like one at the University of Oxford, to make preclinical vaccine batches in house, or adding messenger RNA—the technique behind the Moderna and Pfizer vaccines—to the institute's research portfolio.

D'Enfert hopes the government will beef up research funding and give basic science more “power” and “recognition.” “It shouldn't be just about snapping fingers and putting gas in the engine,” he says. “It has to be sustained in the long term.”

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